U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

BUILDING TECHNOLOGIES PROGRAM

LED Lighting Facts Testing Roundtable Report

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Prepared for:

LED Lighting Facts Program
Solid-State Lighting Program
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Doug Brookman, Public Solutions (Facilitator)
Tom Harold, Grainger
Eric Haugaard, CREE
Marc Ledbetter, Pacific Northwest National Laboratory
Jeff Quinlan, Acuity Brands
Marci Sanders, D&R International
Fred Welsh, Radcliff Advisors
Liesel Whitney-Schulte, Franklin Energy Services

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Introduction

On October 17, 2012 the US Department of Energy (DOE) hosted a round table in Chicago, IL to discuss needs and concerns regarding product testing, as it applies to the LED Lighting Facts program. This roundtable was planned in response to the continued growth of the LED Lighting Facts product list, with the 6,500+ product listings and 1,000 manufacturer, retailer, distributor, lighting professional, and energy efficiency partners. To keep pace with the rapidly developing LED lighting market, the LED Lighting Facts program seeks to balance –the need for verified performance data with the product testing cost burden. It was an opportunity for retailer, utility, specifier, and manufacturer partners to discuss how the LED Lighting Facts program can evolve and continue to be a valuable resource in the growth and development of the LED lighting market.

Currently, manufacturers are required to test all products before being listed with the program. While this has worked well so far and earned it high respect in the industry, the rapidly increasing number of products on the market, coupled with the technology's rapid evolution – which sees new versions coming out as quickly as every six months – necessitates some changes in the system. Simply requiring retesting for all the older products, in addition to testing all of the new ones, would lead to an excessively burdensome requirement for manufacturers – not only financially, but also in terms of maintaining timely listings with a rapidly evolving product line.

Participants were provided with a strawman proposal in advance and asked to come with comments and questions. In all, 16 members of the manufacturer, retailer, utility, and lighting design community joined DOE in this discussion. Additionally, representatives from a larger list of invitees who were unable to attend provided comments in advance. Those comments are included in the Appendix.
Jim Brodrick from DOE opened up the discussion by reiterating the importance of the LED Lighting Facts program to the industry: "The LED Lighting Facts program is one example of the inherent role of the government", he explained. "The government should provide unbiased, educational information and serve as a 3rd party arbitrator for the industry and consumers alike."

Summary of Presentations

The first half of the meeting was spent hearing from partners about their perspective on testing and use of the LED Lighting Facts program. Representatives from DOE also spoke about the current state of the LED Lighting Facts program and reviewed the proposed changes. Below is a summary of all of the presentations.

LED Lighting Facts Review

Marci Sanders, D&R International

Marci Sanders reviewed the evolution of the LED Lighting Facts program. Four years ago it began as a way to encourage manufacturers to test products to LM-79 and provide buyers and specifiers with verified performance data. Now it is a robust program that is used by over 1000 partners in the industry and has become, among other things, the industry standard for verified solid state lighting (SSL).
Because of the exponential growth of the SSL industry and consequently the program, LED Lighting Facts will be implanting new policies to help maintain the integrity of the Product List. The new policies, set to be implemented in November 2012, will require manufacturers to update their product status annually. Under the new policies, each product will be listed on LED Lighting Facts for one year, after which the manufacturer must provide a product status update for that product to remain listed. The manufacturer must first indicate whether the product is still commercially available, and if so, whether it is sold

through regular market channels or through special order. If a product's performance has changed since the initial listing, the manufacturer may provide updated data without the need for retesting.

Despite the direct and mass outreach efforts made by the program, there were still a lot of questions from the manufacturers throughout the roundtable concerning the new enhancements. For example:

- What happens to a product if it expires? *It is moved to an archived list that is searchable but a label can no longer be generated for this product.*
- What happens to a product if I update the information? Does the registration information stay the same or is it a new product? *The registration information stays the same but the label will include a date that shows the last time it was updated.*
- Why was one year chosen for the annual product status update? *It was a clean number and a way for partners to understand that the product needed to be updated. Additionally, SSL products are becoming obsolete so quickly, an annual confirmation of availability will provide a better snapshot of what is actually being sold in the market.*
- Can there be more transparency in terms of who uses the list? Who are the users of this data? *There is a list of all partners on www.lightingfacts.com.*
- I have some products that will not change for 40 years. Why should I have to continue to update them? *The annual status update will allow the LED Lighting Facts database to confirm that your products are still market available.*

Panel: LED Lighting Facts Users' Perspectives on Testing

Manufacturer Perspective on Testing

Jeff Quinlan, Acuity Brands

Jeff Quinlan provided perspective on the potential burdens product testing can impose for manufacturers.

- LED Lighting Facts label is an important component to ensuring that false or misleading claims are not rampant in the market place.
- Noted that photometric tests have doubled in the past five years and have started to slow down the production of new products. The 12 week lead time to complete photometric tests is starting to hamper innovation. Specifically, he listed the number of LEDs, reflector finishes, distribution, color temperatures, families and various performance variables as causing complications during photometric tests.
- Unnecessary to test all related products because the differences are nominal; they expect a 2% variation depending on the variables. They can extrapolate the data without doing an LM-79 test on each one because they understand how the various components work.

    - Proposed defining which product data changes needed to be reported and which did not. If major changes occur related to, for example, energy or color, this should be explained via test reports. But customers do not need to know if a product is now using less energy, or achieving higher efficacy, higher CRI or higher lumen maintenance.

Manufacturer Perspective on Testing

Eric Haugaard, Cree

Eric Haugaard began his presentation with examples for how HID lamp performance is tested and calculated. Because HID lamps will vary in performance at the application level, they use predictability

models for performance data. For LED products,the contributing performance variables are different, but still exist. They include small luminous flux increments, a wide range of system power options and optics. Haugaard questioned the need to test every variation, and demonstrated that it is possible to calculate performance results based on known engineering relationships in the products that correlate very closely to tested lab results. He compared the calculation of photometric scaling with a correlation method using the same product that demonstrated the advantages of precision with the correlation method.

EE Sponsor Partner Perspective on Testing

Liesel Whitney-Schulte, Franklin Energy (Wisconsin Focus on Energy)

Liesel Whitney-Schulte reviewed how energy efficiency program sponsors use the LED Lighting Facts program and how important accurate product data is to program developers. Program sponsors are very concerned about the inaccurate claims received from some manufacturers and importers specifically. Whitney-Schulte has seen some very questionable claims and referred to the market as a whole as the "wild west".

- The LED Lighting Facts list has become an invaluable source of product information that impacts how they design programs – now and in the future. It provides a snapshot of where the market is going which program sponsors use for budgeting and planning purposes.

Even though she sympathizes with the excessive testing, she also feels like manufacturers who are willing to publish their data are more trustworthy. Their primary concern is end user satisfaction. If customers don't like the product, the program sponsor will be responsible in the back end. Program sponsors are evaluated on customer satisfaction and effective use of ratepayer funds.

- Responding to the strawman proposal, Liesel said that if there is a family policy, it needs to be coordinated for ease of use for incentive programs. The program sponsors have to be able to convince regulators that the product information is reliable. She noted that it is really difficult to review all the different iterations of LEDs. Thanks to LED Lighting Facts, they do not have to have a lot of conversations with manufacturers about off brand products because the data isn't available to back up the claims. This benefits the reputable manufacturers because they aren't losing sales to smaller [and potentially less reputable] manufacturers.

John Delaney from ComEd said that when it comes to products, the wheat needs to be separated from the chaff. Perhaps manufacturers could be graded on, for example, an A – D scale. Reputable companies that are developing quality product deserve preferential treatment over the ones that are producing poor products.

Elaine Miller from NEEA added more utility perspective, saying that in addition to the customer service aspect, incentivizing quality LEDs is important from a resource planning issue. Efficiency program sponsors must know the product details, including changes that may occur over time and with new iterations. Program managers need to know how products are performing and will continue to perform as they are the ones making resource investments on them.

Retailer Perspective on Testing

Tom Harold, W.W. Grainger

Tom Harold spoke to how from the onset of the LED Lighting Facts program, it has been an invaluable resource to Grainger when evaluating and purchasing products. LED Lighting Facts is an important component to their purchasing process and Grainger believes that the program has been the driver that has advanced the testing discussion in the industry as a whole. Customer satisfaction is the number one

priority for Grainger. Any time a customer has a bad experience with any product, it speaks to the Grainger portfolio as a whole.

Some manufacturers followed up Harold's presentation about how they define customer dissatisfaction and if customers really notice nominal changes in performance. Harold clarified that customers may not know if a product isn't performing specifically as advertised, but they know if it isn't performing as expected. Other manufacturers also asked why retailers are being so strict about testing and validation with LEDs. Harold explained that it is a maturity question. The products have not been on the market long enough to develop their own validation. There is a "wild west" mentality and retailers have to do everything they can to ensure that the products they sell are going to make customers happy.

LED Lighting Facts Strawman Proposal

Fred Welsh, Radcliffe Advisors

Fred Welsh's presentation reviewed the strawman proposal that was distributed before the meeting. The proposal was intended to provide a discussion focus for how we might go about reducing LED Lighting Facts testing burden (costs and hassle) while maintaining the accuracy of the product performance values in the database. Fred stated that any changes must be cost effective and take full advantage of the opportunities that LEDs present because, as he predicts, LEDs will become a very large portion of the market in the next 5 to 6 years. Welsh acknowledged there is wide spread consensus that the LED Lighting Facts program is useful and appreciated. The goal moving forward is to come up with a methodology that will maintain the high level of confidence the program already has but also address the high volume and ageing of products on the list.

The first recommendation is to allow manufacturers to identify product families. DOE "isn't smart enough" to determine how these families should be defined, as each manufacture has a different set of product designs. But the manufacturers will be expected to define and explain the rationale behind family groupings. DOE will try to verify family definitions and will test samples. Manufacturers will still be expected to confirm product availability annually and report changes as relevant and appropriate. Welsh provided some examples of potential family groupings:.

- Example of family definition that would be accepted by the program: Product families in which the models differ in superficial ways but all the products have the same performance values.
- Example of a family definition that may be accepted, but would require additional verification: Product families that have different color temperatures or beam angles.
- Example of a family definition that would not be accepted: Family members that have several parameters that are calculated off baseline products or vastly different outputs and efficacies. The baseline product also cannot be much older than the other family products.

Welsh provided more details for how the LED Lighting Facts program would monitor the information:

- The program would reserve the right to ask for additional inputs from the manufacturer.
- LED Lighting Facts would also have to establish a tolerance schedule for departures from listed values.
- Concerning the process of verification testing of products for quality control, the details on how excursions would be handled still need to be determined.
- Finally, Welsh confirmed that this would require a fee-based system that has not been determined, but would include a uniform testing fee. The fee will generate the funding pool to support program verification testing, but will be less of a cost burden to the manufacturer then they currently have with the requirement to test every product listed.

Following Welsh's presentation, Alex Boesenberg from NEMA recommended that participants and DOE reference the LSD white paper 63 on tolerances as it addresses a number of the same parameters. Multiple manufacturers had questions about the fees, which have not been determined and are separate from the proposed listing fees presented by Marci Sanders. The manufacturers also requested more information on what the fees will cover and an exact breakdown of what the fees would support. The manufacturers requested details on multiple factors, all of which will need to be defined, such as which labs would be qualified to test products, defining the baseline for extrapolating the test data and understanding how the LED Lighting Facts product groupings would relate to other family grouping policies (ex: DLC).Finally many wanted information on the timeline for these changes and information on how the website will support these efforts. Welsh explained that that level of detail has not been decided and could be in discussed further by this roundtable.

Roundtable Discussions

Review of the Strawman Proposal

The remainder of the meeting was focused on encouraging discussion about the strawman proposal. Facilitated by Doug Brookman, the group began by identifying the positive aspects of the proposal. Next, they reviewed the proposal by paragraph which allowed participants to identify issues which were missing or unresolved in the current draft of the proposal and offer ideas. Finally, the group discussed the next steps for moving forward. Below is a summary of the discussions.

Proposal Review: Positive Aspects

- Allows for verification testing to validate family definitions and photometric performance calculations
- Allows for manfucatures to define and justify family grouping methodology
- Reduced testing costs with family structure
- The purpose of the verification testing fee is to reduce the net cost for manufacturers. It will reduce the testing burden costs that a manufacturer has to now pay in order to participate (re: the current LM-79 label requirement for all submissions)

- Increased data credibility through 3rd party verification program testing

- Potential to develop approaches that discourage inaccurate performance calculations

Proposal Review: Unresolved issues in the current draft of the proposal

- Defining families
    - What defines a new listing vs. a family grouping listing?
- Verification testing:
    - If you just did random sampling of all of the products, would the threat be enough as a way of reducing future testing? Would the prospect of coming up in the lottery is enough to make sure that they will comply with accuracy requirement?
    - Need more details concerning the frequency of testing; can there be a limit to the number of times a manufacturer and/or product is tested?

- How do products relate to each other when one fails verification testing?
    - Do all of the products in a family fail?

    - How will LED Lighting Facts publicize results?
- The range of acceptable performance variability needs to be defined
    - Allowable tolerances for excursions
    - Asymmetrical tolerances: at what point does a manufacturer report a change?
    - The biggest concern about setting tolerances is the tendency to report more favorable data rather than average or worst results.
- Will the listing fees be applied to all the products in a family?
    - What constitutes a unique product listing; this needs to be defined in the context of what products are charged fees.
    - Concern that the fees will continue to increase over time, and will become burdensome.
- Who are the users of the program – who they are and how they use the program needs to be defined.
- How do other programs define families and how will their involvement with LED Lighting Facts change with this policy?
    - Interest in aligning products with DLC and LED Lighting Facts.
    - Utilities will want granular product performance and update details to define the models listed with LED Lighting Facts

  How will manufacturers that are consistently selling poor quality products going to be impacted by the proposed changes?

The group identified several issues that were not addressed in the proposal for discussion and consideration:

- At what point is the program sustainable (in relation to the fee structure)?
- Annual process vs. proactive listing: what drives the needs for a product to be updated?
    - What types of changes in product performance are important to data users?
- Would challenge-testing offer any advantages to verifying product performance?

- For products that are no longer available in the market, include an easy check box for updating listings.
- Does it make sense to delay listing fees due to the new structure looking at separate fees to cover verification testing?

The group also listed some of the limitations associated with the LED lighting market as a whole, as they apply to the LED Lighting Facts program and proposed changes:

- The barrier into this market is very low and allows many companies to sell and manufacturer poor quality products
- Reliability needs to be defined and required as part of the LED Lighting Facts program

Conclusion and Next Steps

As a whole, the 18 roundtable participants were supportive of working with DOE toward a common goal of making the LED Lighting Facts program work better for all partners. It was agreed that the strawman proposal was a good first step in revising how products are defined and listed with LED Lighting Facts. However, there are multiple details that need to be further defined and clarified. The DOE representatives agreed to take the recommendations made by the roundtable participants and

incorporate them into a new proposal. DOE plans to expand the group of reviewers for next revision and committed to scheduling a webinar in order to receive partner feedback.

Appendix A: List of Participants

1. Derry Berrigan, DB Power of 3
2. Alex Boesenberg, NEMA
3. Terry Clark, Finelite
4. Keith Cook, Philips
5. John Delaney, ComEd
6. Jacob Hannan, MEEA
7. Tom Harold, Grainger
8. Eric Haugaard, CREE
9. Joseph Howley, GE
10. John Linn, NEEP
11. Elaine Miller, NEEA
12. Jeff Quinlan, Acuity Brands
13. Doug Seymour, Osram Sylvania
14. Bob Smith, Cooper Lighting
15. Tom Stimac, GE
16. Theresa Bair, EyeLighting
17. Liesel Whitney-Schulte, Franklin Energy Services
18. Jennifer Dolan, Osram Sylvania
19. Jim Brodrick, DOE
20. Doug Brookman, Public Solutions
21. Holly Kroll Smith, D&R International
22. Marc Ledbetter, PNNL
23. Marci Sanders, D&R International
24. Fred Welsh, Radcliff Advisors

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